NSF DISTINGUISHED LECTURE SERIES BIOECONOMY COORDINATING COMMITTEE 2022

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TRANSFORMING BIOECONOMIC DISCOVERIES INTO INNOVATIVE COMMERCIAL TECHNOLOGIES

DATE
February 3rd

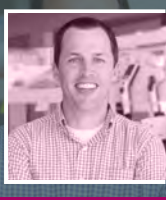
TIME
11am -12:45pm

LOCATION
Register

VIEW
YouTube

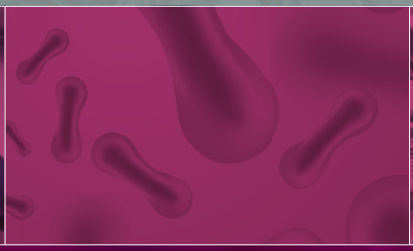
SPEAKERS

Christine Santos, PhD



Will DeLoache, PhD

Dan Widmaier, PhD



National Science Foundation

ABSTRACT

Reinventing Chemical Manufacturing Using Biotechnology: Manus Bio Approach

Chemical manufacturing is undergoing a period of change, from an era focused on petrochemical-derived chemical synthesis or plant extraction to one which leverages engineered chemical biosynthesis in microbes for biomanufacturing. At Manus Bio, we have developed a robust technology platform from discovery to manufacturing which enables the economical and sustainable production of typically rare complex natural products. Here, I will highlight some of the important insights and guiding principles used to engineer complex biochemical pathways and scale up our process from lab to large scale manufacturing.

ABOUT DR. CHRISTINE SANTOS

CHRISTINE SANTOS, PhD

CHIEF TECHNOLOGY OFFICER

MANUS BIO

Christine Santos is the Chief Technology Officer of Manus Bio, a US-based manufacturer of sustainable natural ingredients through fermentation. She has almost two decades of experience in applied research in the areas of biochemical engineering, industrial biotechnology, and synthetic biology. She is a co-inventor on 20+ issued and pending patents and has published her work in several elite journals, including Science, Nature, and PNAS. Christine obtained her BS and MS in Chemical Engineering from Stanford and her PhD in Chemical Engineering from MIT.

ABSTRACT

As the molecular mechanisms underlying the associations between the microbiome and disease are unraveled, delivering defined activities to the gut will become an increasingly important therapeutic modality. A key challenge for microbiome therapeutics is delivering predictable, high doses of a therapeutic microbe despite widely varying patient microbiomes.

To overcome this challenge, Novome has developed a suite of synthetic biology tools for engineering highly abundant gut commensal microbes to predictably carry out defined therapeutic functions in the gut. We call the resulting therapeutic strains GEMMs – Genetically Engineered Microbial Medicines. GEMMs are engineered to consume a prebiotic control molecule that can't be metabolized by other gut microbes, so that even within a complex community, the GEMM can be exclusively fed with the control molecule. By creating this exclusive niche, we can colonize diverse, and even resistant, microbiotas at a predictable and tunable level. To avoid the uncontrolled release of engineered strains, GEMMs are further modified to depend on the control molecule for their survival, such that they are only viable in subjects who are actively being dosed.

Novome's lead asset is a GEMM designed to treat enteric hyperoxaluria, a chronic disease with no FDA-approved therapies in which over-absorption of oxalate from the diet results in recurrent kidney stones. Inspired by natural oxalate degrading bacteria often found in the gut at low levels, Novome's GEMM has been engineered to rapidly degrade oxalate and has proven to effectively treat hyperoxaluria in multiple animal models of the disease.

A recently completed first-in-human study in healthy volunteers demonstrated safety and tolerability of the therapy as well as platform proof-of-concept that GEMM colonization can be precisely controlled by once-daily oral dosing of the prebiotic control molecule. Novome is continuing to expand our therapeutic pipeline to address additional diseases such as inflammatory bowel disease where we recently announced a partnership with Genentech to apply our GEMMs platform to deliver multiple therapeutic cargos of interest.

ABOUT DR. WILL DELOACHE

WILL DELOACHE, PhD

CO-FOUNDER & CHIEF SCIENTIFIC OFFICER

NOVOME BIOTECHNOLOGIES

Dr. DeLoache is Co-Founder and Chief Scientific Officer of Novome Biotechnologies, a biotechnology company based in South San Francisco that is engineering bacterial therapeutics for chronic diseases. Until 2019, he served as President and CEO of the company, helping to raise a combined $40M in financing. Prior to Novome, he worked as a Scientist at Zymergen, where he led the development of the company's next-generation sequencing pipeline. Dr. DeLoache earned his Ph.D. in Bioengineering at the University of California, Berkeley, studying synthetic biology and metabolic engineering in the laboratory of John Dueber. He received his B.S. with Honors in Biology from Davidson College.

ABSTRACT

Bolt Threads invents and scales innovative materials that put us on a path towards a more sustainable future. Taking inspiration from the natural world, we experiment with biology to find new technologies that work with nature, not against it, like Mylo™. A sustainable alternative to leather, Mylo is in-use by some of the world's most iconic companies like Adidas, Lululemon, Mercedes, and Stella McCartney. Made from infinitely renewable mycelium, the complex latticework of underground fibers so strong they hold the planet together, Mylo is everything you love about leather without everything you (and the planet) don't.

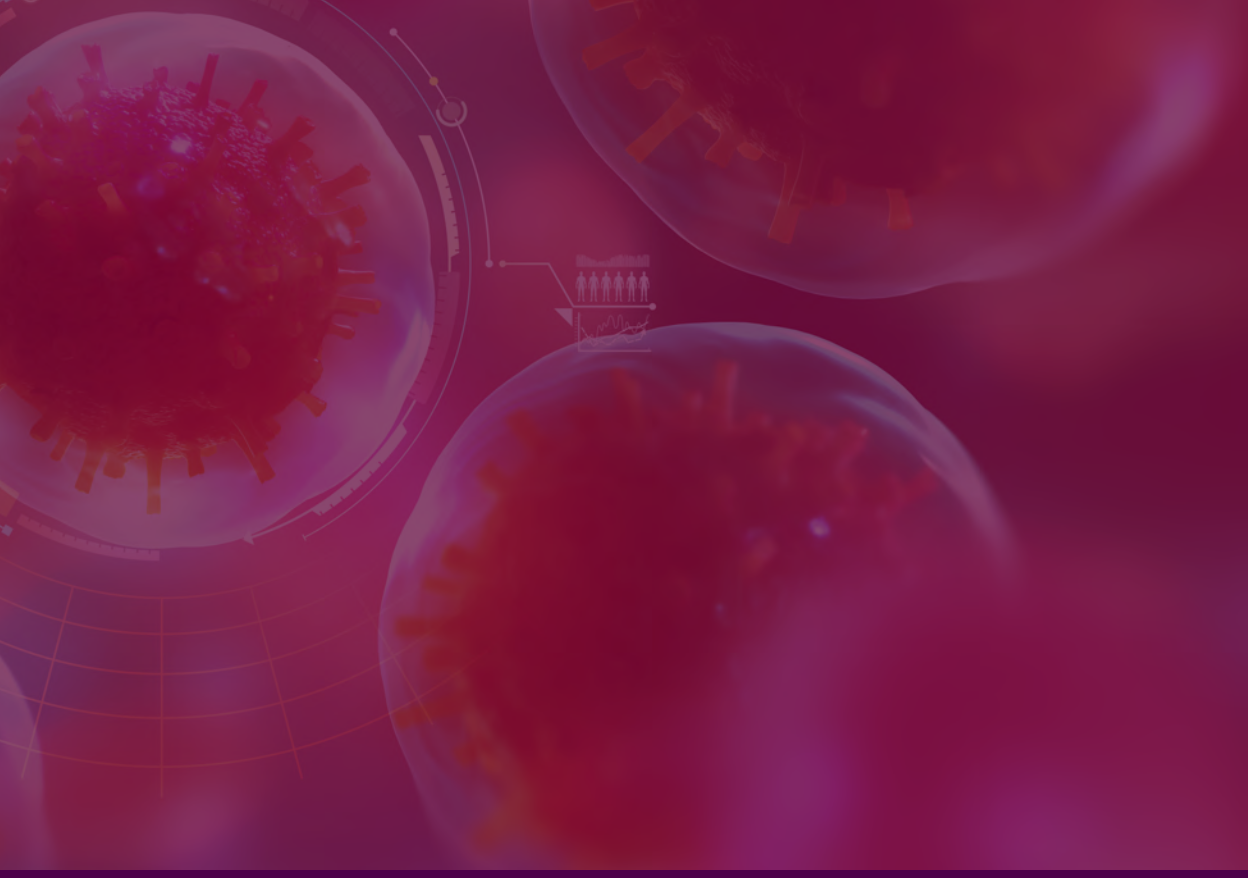
ABOUT DR. DAN WIDMAIER

DAN WIDMAIER, PhD

CHIEF EXECUTIVE OFFICER

BOLT THREADS

Dan Widmaier is the Founder and CEO of Bolt Threads. Dan earned his PhD in Chemistry and Chemical Biology from UC San Francisco, where his graduate research involved designing genetic circuits to control microbial organelles. In 2009, he and his two co-founders founded Bolt Threads, which is creating the next generation of materials using biotechnology. Harnessing his experience in both science and business development, Dan has grown Bolt Threads from an incubator start-up to a biomaterials platform company with 75 employees. He has led Bolt Threads through multiple fundraising rounds, created lasting partnerships with iconic global brands like Stella McCartney, and launched commercially available materials including Mylo™ – a mycelium-based leather alternative - with a select group of partners including Adidas, Kering, Lululemon, and Stella McCartney.



NSF Bioeconomy Coordinating Committee Distinguished Lecture Series

NSF invests in fundamental research to support biotechnology and advance the U.S. bioeconomy across all fields of science and engineering. Presented by NSF's Bioeconomy Coordinating Committee and NSF Directorates, this distinguished lecture series will bring in individual speakers and panels representing the science and technology funded by a Directorate every month. Speakers will present on research and broader impacts in areas associated with biotechnology and the bioeconomy that are of interest broadly across the foundation.

All sessions will be conducted virtually.

For more information, refer to the NSF Bioeconomy Distinguished Lecture Series website or contact **Jared Dashoff** at jdashoff@nsf.gov.

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